

A Comparison of Heart Rate Threshold Points Between High Fit and Recreational Fit Cyclists

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ABSTRACT

The shape of the heart's response to incremental exercise can be explained by two neural responses referred to as parasympathetic and sympathetic activity. Changes at parasympathetic withdrawal and heart rate threshold have been noted. The purpose of this study is to assess heart rate threshold points between groups of differing fitness status. Heart rate data was archived from tests done in the Cycling Performance Center on the campus of Midwestern State University. Male and female cyclists acted as subjects. The following was assessed: age (years), height (cm), weight (kg), body fat (%) and heart rate (bpm) each 20 sec. Fit demographic quartiles were established based on maximal oxygen consumption (Max VO₂) with quartile 1 being the least fit and quartile 4 being the most fit. Quartile heart rates were compared to data from recreational subjects. Thresholds were established utilizing a log-linear cross-over design. Points of threshold with actual heart rates were compared for associations or differences. A Pearson Product R Correlation analysis was used to establish correlations. An independent samples t-Test with Tukey post hoc comparisons was used to determine differences between groups. Statistical significance was determined *a priori* at $p \leq 0.05$. Mean (SD) descriptive values were the following: age, 19.5 (1.9) y; height, 177.5 (4.1) cm; weight, 80.6 (5.6) kg; body fat 8.3 (1.1) %. Threshold heart rates (bpm) between groups were the following for parasympathetic withdrawal and heart rate threshold, respectively: quartile 1-151, 171; quartile 2-134, 157; quartile 3-139, 157; quartile 4-134, 152; recreational-120, 175. Heart rates at parasympathetic withdrawal were significantly ($p < 0.05$) associated between quartiles 2, 3 and 4. Quartile 1 had a significantly ($p < 0.01$) higher heart rate than all groups. The recreational group had a significantly ($p < 0.05$) lower heart rate than all groups at parasympathetic withdrawal. Heart rate at threshold was similar for quartiles 2, 3 and 4. These quartiles were significantly ($p < 0.01$) lower than quartile 1 and the recreational group heart rate at threshold. Threshold points of occurrence were similar across groups. Heart rates varied at both parasympathetic and threshold. Heart rates were higher at threshold with the low fit group compared to the more fit group. The recreational group had the lowest heart rate at parasympathetic withdrawal compared to the fit quartiles. These alterations in heart rate indicate favorable differences as fitness status is increased.

